PAN-PACIFIC ENTOMOLOGIST
July 1981, Vol. 57, No. 3, pp. 443–446

THE EFFECTS OF AN OUTBREAK OF *TRIDEPIA NOVA* (SMITH) (LEPIDOPTERA: NOCTUIDAE) ON FOUR-WING SALTBUSH, *ATRIPLEX CANESCENS* (PURSH) NUTT.

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From 24 August 1977 to 30 August 1977 large numbers of *Tridepia nova* (Smith) larvae were observed on Wupatki National Monument in northern Arizona. The monument is located 42 km north of Flagstaff, Arizona at an elevation of 1432 m. During the outbreak, the moth larvae were observed feeding only on Four-wing saltbush, *Atriplex canescens* (Pursh) Nutt., which is abundant throughout the Cold Desert Shrub community of the monument. Comstock (1929) and Tietz (1972) have reported that a related species, *Trichoclea antica*, feeds solely on *A. canescens*. Although weekly sampling indicated that the outbreak apparently lasted only six to nine days, damage to many of the plants in certain areas of the monument was extensive. Damages included almost complete defoliation of the shrubs and considerable damage to many of the saltbush seeds.

Tridepia nova was first described as *Trichoclea nova* (Smith, 1903). Later, McDunnough (1938) placed it in *Tridepia*. Smith (1903) described adults as having a pale grayish ground color due to the mixing of white and smoky scales. The last instar larvae are light green to pale yellow in color and about 20 mm in length. These features resemble other closely related species (Comstock, 1929; Benjamin, 1932).

Observations

There is some uncertainty as to the area covered and exact time span of the outbreak, but the larvae were seen consuming Four-wing saltbush on 24 August 1977. Observations after 30 August 1977 indicated that few, if any, larvae remained on the saltbush. Several park rangers noticed the outbreak on 25 and 26 August, but none reported seeing *T. nova* larvae before 24 August 1977. Thus, the outbreak probably lasted from six to nine days.

The range of the outbreak probably included Antelope Mesa as the western boundary because of the scarcity of saltbush west of the mesa. Due to the brevity of the outbreak and sampling restrictions, the exact boundaries of the outbreak were not determined. However, observations near the Wupatki visitor center indicated that the area immediately around the visitor

center could have been the eastern limit of the outbreak. The northern and southern limits of the outbreak were not determined.

During the outbreak, *T. nova* larvae were observed feeding not only on Four-wing saltbush leaves, but also on the four enlarged bracts that constitute the wings of the saltbush seeds. Interestingly, some saltbush plants were left relatively untouched by the moth larvae during the 1977 outbreak.

Larvae collected from saltbush plants pupated in soil in the laboratory and commenced emergence several weeks later on 13 September 1977. The emergence of adult moths in the lab corresponded to the few black-light captures in the field. Although *T. nova* individuals were collected by sweeping, pitfall trapping, and by a black-light trap in 1977, not one individual was captured in 1978 using the same methods in the same area.

The larvae expressed several possible defense mechanisms although no predation by vertebrates or arachnids was observed. First, the larvae resembled the leaf color of the Four-wing saltbush. Behaviorally, the larvae moved little while on the saltbush, presumably to enhance concealment. Secondly, when the larvae were touched they quickly dropped to the ground under the dense growth of the shrub, where they were extremely difficult to locate. Third, when handled the larvae secreted a brown substance that was probably repugnatorial.

Discussion

Four-wing saltbush is named for the four enlarged bracts that surround the saltbush seeds. Since the wings on these seeds aid in seed dispersal, any factor that would remove the bracts would tend to reduce seed dispersal. As mentioned, the larvae attacked not only the saltbush leaves but also the wings of the saltbush seeds. Thus, it is possible that the 1977 *T. nova* outbreak may have reduced the seed dispersal and slowed the growth of existing saltbush plants in succeeding years. During the summer of 1978, much less rain fell than during the summer of 1977. The resulting xeric conditions of 1978 suppressed much of the saltbush growth. Therefore, it was impossible to conclude what effect the 1977 outbreak of *T. nova* had on the saltbush in succeeding years, if any, since the dry 1978 spring and summer obscured any effects of the 1977 larval feeding damage.

Some saltbush plants were not fed upon by *T. nova* larvae in 1977, and it is possible that these plants were missed due to chance. However, the high larval densities throughout the outbreak area probably precludes this as an explanation. More likely, chemical differences between plants may have accounted for the absence of *T. nova* larvae on certain saltbush plants. Sharma et al. (1972) have found that sodium and chloride concentrations increase progressively with corresponding decreases in rainfall. If certain plants were located in soil with relatively low moisture retention, they may

have had electrolyte concentrations above the tolerance levels of the larvae, and the plants would not have been palatable to the moths.

The appearance of *T. nova* larvae in late August may be an adaptation to low electrolyte levels in the *Atriplex*. The Cold Desert Shrub community of Wupatki National Monument usually receives heavy rainfall in the form of summer thunderstorms from mid-July to late August. Upon hatching in late August, the larvae would find both adequate moisture and the lowest electrolyte concentrations, resulting from the summer rains.

Although the 1977 outbreak area was sampled in 1978 using the same collecting methods that had detected *T. nova* individuals in 1977, no adults or larvae were seen. Possibly, intense predation or disease reduced the population dramatically. The larvae did apparently possess defense measures, such as cryptic coloration, avoidance behaviors, and the secretion of a probable repellent.

Summary

An outbreak of *Tridepia nova* was observed on Wupatki National Monument, Arizona, during the last week of August 1977. The moth larvae fed exclusively on Four-wing saltbush (*Atriplex canescens*) within part of the Cold Desert Shrub community of the monument. Both saltbush leaves and seed bracts were consumed. With many plants, almost complete defoliation occurred. The removal of the seed wings by the larvae probably decreased overall seed dispersal in 1977. Some saltbush plants were not fed upon by these larvae in 1977, and it is speculated that higher sodium and chloride concentrations in spared plants may have deterred the larvae from feeding on them. The *T. nova* larvae possessed several defenses, which included cryptic coloration, various behavioral adaptations for concealment, and the secretion of a brown substance that probably served as a predator repellent.

Acknowledgments

I especially wish to thank Dr. C. D. Johnson of Northern Arizona University for his encouragement and guidance. Moth larvae and adults were identified by Don Weismann, and Dr. James Rominger contributed information about the Four-wing saltbush on the monument. Funds that were provided to Northern Arizona University as grants 950189 and 950236 by the National Park Service to help in this study are gratefully acknowledged.

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Footnote

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